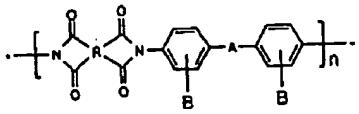
WHAT IS CLAIMED IS:

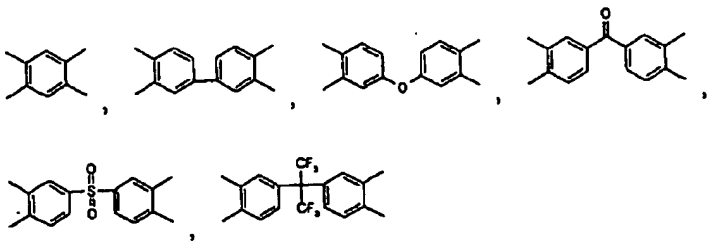
1. A nanocomposite, wherein said composite is formed of modified polyhedral oligomeric silsesquioxane (POSS) and polyimide through covalent bonding, and are a self-assembled system with low dielectric constant and certain mechanical properties.

2. The nanocomposite according to Claim 1, wherein the polyhedral oligomeric silsesquioxane is of reactive functional group, which is typically represented by chemical formula $(SiO_{1.5})_nR_{n-1}R'$, wherein n=6, 8, 10, 12, R is alkyl having 1 to 6 carbon atoms or phenyl, R' is $-R_1-B$; R_1 is alkyl having 1 to 6 carbon atoms or phenyl, and B is selected from group at least consisting $-NH_2$, -OH, -Cl, -Br, -I, or other derivatives having diamine group ($2NH_2$), for example, reactive functional groups as $-R_1-N(-Ar-NH_2)_2$, $-R_1-O-Ar-CH(-Ar-NH_2)_2$ and the like.

3. The nanocomposite according to Claim 1, wherein the polyimide typically has polymerization units represented by following formula:



wherein R is



wherein A is -O-, -S-, $-CH_2-$, $C(CH_3)_2$, or $C(CF_3)_2$ and the like; B is -H, -OH, or $-NH_2$.

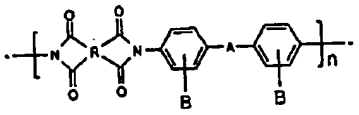
4. The nanocomposite according to Claim 1, wherein the dielectric

constant of said composite is reduced to 2.3.

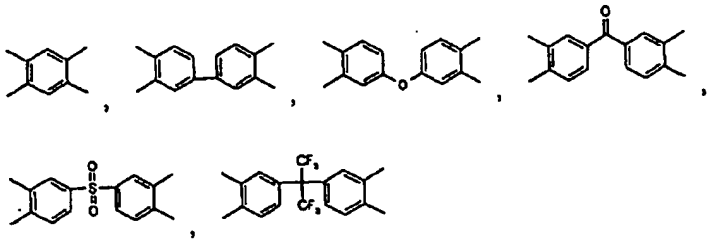
5. A process for synthesizing polyhedral oligomeric silsesquioxane/polyimide nanocomposites, wherein porous type inorganic oxide oligomers are formed, and then are reacted with dianhydride, or directly through reacting with synthesized polyimide, which is characterized in that POSS tethering nanopores is covalently bonded to side chains of polyimide.

6. The process according to Claim 5, wherein the polyhedral oligomeric silsesquioxane is of reactive functional group, which is typically represented by chemical formula $(SiO_{1.5})_nR_{n-1}R'$, wherein n=6, 8, 10, 12, R is alkyl having 1 to 6 carbon atoms or phenyl, R' is $-R_1-B$; R_1 is alkyl having 1 to 6 carbon atoms or phenyl, and B is selected from group at least consisting $-NH_2$, -OH, -Cl, -Br, -I, or other derivatives having diamine group ($2NH_2$), for example, reactive functional groups as $-R_1-N(-Ar-NH_2)_2$, $-R_1-O-Ar-CH(-Ar-NH_2)_2$ and the like.

7. The process according to Claim 5, wherein the polyimide typically has polymerization units represented by following formula:



wherein R is



wherein A is -O-, -S-, $-CH_2-$, $C(CH_3)_2$, or $C(CF_3)_2$ and the like; B is -H, -OH, or $-NH_2$.

8. A process for lowering dielectric constant of polyimide, wherein porous type inorganic oxide oligomers are formed, and then are reacted with dianhydride, or directly through reacting with synthesized polyimide, which is characterized in that said inorganic oxide oligomers tethering nanopores connect to polyimide regularly with covalent bonds, and are a self-assembled system.

9. The process according to Claim 8, which is applicable to the distribution or assembly of inorganic molecular cluster in polyimide.

10. A precursor for use in preparing polyhedral oligomeric silsesquioxane, wherein said precursor is typically represented by chemical formula $(SiO_{1.5})_nR_{n-1}R'$, wherein n=6, 8, 10, 12, R is alkyl having 1 to 6 carbon atoms or phenyl, R' is $-R_1-B$; R_1 is alkyl having 1 to 6 carbon atoms or phenyl, and B is selected from group at least consisting $-NH_2$, -OH, -Cl, -Br, -I, or other derivatives having diamine group ($2NH_2$), for example, reactive functional groups as $-R_1-N(-Ar-NH_2)_2$, $-R_1-O-Ar-CH(-Ar-NH_2)_2$ and the like.